

Research report

# Cognitive dietary restraint and cortisol: Importance of pervasive concerns with appearance

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## Abstract

The purpose of this study was to elucidate the nature of the relationship between dietary restraint and physiological stress, by investigating which eating and body-related constructs are related to salivary cortisol and to perceived stress. Female undergraduates ( $N = 170$ ) completed self-report measures on dietary restraint, appearance beliefs, body satisfaction variables, perceived stress, and eating self-efficacy. Participants also provided two saliva samples. The first sample was collected after awakening, and the second was collected 6–8 h later. A factor analysis was performed in order to reduce redundancy in the set of measures surrounding eating and body attitudes, which yielded three factors. The findings indicated that women with stronger beliefs about the importance of their appearance, as well as negative emotions and cognitions surrounding their body image, had higher levels of cortisol in the afternoon. These appearance and body-related constructs were also associated with higher levels of perceived stress. However, perceived stress was not associated with salivary cortisol. There were no significant relationships between any of the eating or psychological variables and morning cortisol levels. These results suggest that dysfunctional cognitions surrounding appearance and body image significantly contribute to the relationship between dietary restraint and elevations in cortisol excretion. Implications for interventions and women's health are discussed.

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## Introduction

Western societies are battling an escalating prevalence of obesity and obesity-related illness (Flegal, Carroll, Kuczmarski, & Johnson, 1998), and food is seen less and less as a source of pleasure, and more of a source of concern (Rozin, Fischler, Imada, Sarubin, & Wrzesniewski, 1999). Americans, and American women in particular, are the least likely to make culinary and pleasure-related associations with food, and are more ambivalent about food than are people from other nations (Rozin et al., 1999). To better understand this ambivalence, researchers have begun to distinguish actual dieting behaviour from mental preoccupation with dieting and food, with the latter referred to as 'cognitive dietary restraint'(CDR).

CDR is a key construct in the literature on dieting, and refers to the desire to restrict food intake in an effort to maintain one's weight or produce weight loss (Herman & Polivy, 1975). CDR is thought of as an attitude towards food that is, in good part, independent from dieting behaviour. It is largely uncorrelated with caloric intake measured surreptitiously (Stice, Fisher, & Lowe, 2004), and does not necessarily involve a particular set of eating habits. Those scoring high in CDR do not report consuming fewer calories based on food diaries (Beiseigel & Nickols-Richardson, 2004) and they frequently report that they are not currently dieting despite their mental preoccupation with food (Green & Rogers, 1995; Lowe & Timko, 2004). To summarize, the label of CDR or 'restrained eater' does not in and of itself imply that one is actively dieting or losing weight, but instead refers to heightened consciousness and preoccupation with food and diet. The purpose of this study was to examine the relationship between CDR (a preoccupation that may

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serve as a stressor), associated psychological constructs, and an objective physiological stress marker, namely, cortisol.

### **What leads us to believe that those high in restraint are stressed?**

#### *Endocrinological features*

Preoccupation with diet and food choice can act as a subtle, but perhaps chronic psychological stressor that activates the stress response, given that we are constantly exposed to food cues. Three studies reveal that women scoring high on the Three Factor Eating Questionnaire's (TFEQ; Stunkard & Messick, 1985) cognitive restraint scale have elevated levels of salivary and urinary cortisol (Anderson, Shapiro, Lundgren, Spataro, & Frye, 2002; McLean, Barr, & Prior, 2001a; Rideout, Linden, & Barr, in press). Women scoring high in restraint have higher cortisol levels when assessed in the morning (Anderson et al., 2002), and have significantly higher 24-h urinary levels of cortisol (McLean et al., 2001a). In the latter study, urinary cortisol was not found to be correlated with exercise, nutrient intake, or weight fluctuation (McLean et al., 2001a), thus highlighting that the cognitive component, and not behavioural dieting per se, is related to cortisol excretion.

The relationship between 24-h urinary cortisol and cognitive restraint was also replicated with postmenopausal women (Rideout et al., in press) such that the only variable significantly related to urinary cortisol was CDR. Highly restrained women did not differ from low-restraint women with respect to energy intake, and had similar body weights and composition. The authors of these studies collectively surmised that the constant attention to food and the struggle to alter one's body weight or shape act as a chronic stressor. Women with eating disorder tendencies (those scoring higher on a bulimia symptomatology scale) also showed elevated cardiovascular reactivity to a lab stressor and depressed urinary epinephrine levels (Koo-Loeb, Costello, Light, & Girdler, 2000).

Taking these observations one step further, a worrisome effect of restraint-related hypothalamic–pituitary–adrenal (HPA) axis activation is that CDR has been found to be associated with self-reported menstrual irregularity in women (McLean & Barr, 2003), even when controlling for body weight. Also, women with high CDR display objective signs of subtle menstrual disturbances (Barr, Prior, & Vigna, 1994; Schweiger, Tuschl, Platte, Broocks, & Laessle, 1992): namely, decreased and shortened progesterone production in the luteal phase. Barr et al. (1994) had similar findings: using measures of basal temperature over at least three menstrual cycles, women in the upper tercile of CDR had shorter luteal phases.

CDR is also an independent negative predictor of lumbar spine mineral density in young women, and appears to attenuate the positive effects of exercise on

bone density (McLean, Barr, & Prior, 2001b). Elevated cortisol secretion may be the culprit for both menstrual irregularity and bone density: corticotropin releasing hormone interrupts the release of gonadotropin secretion, leading to lower concentrations of luteinizing hormone and follicle-stimulating hormone, both of which are associated with disturbances in ovulation (Barbarino et al., 1989). Elevated cortisol levels have been associated with lower bone mineral density by affecting calcium homeostasis, and inhibiting bone formation. In addition, menstrual dysfunction and irregularity affects circulating sex steroids and thus can lead to bone loss (Prior, Vigna, Schechter, & Burgess, 1990). Hence, chronic CDR may have many far-reaching, health-compromising implications.

#### *Cognitive features*

Concentration difficulties, distractibility, and poorer performances on cognitive tasks are considered some of the cognitive effects of stress (Cohen, 1980). Findings indicate that dieters and those high in CDR display impairments in cognitive performance in the absence of significant weight loss (Green, Rogers, Elliman, & Gate- nby, 1994; Jones & Rogers, 2003; Vreugdenburg, Bryan, & Kemps, 2003). These deficits are not related to differences in physiological states, such as low glucose levels (Green & Rogers, 1995), but are attributed to food and dieting-related preoccupation (Jones & Rogers, 2003). For instance, research participants scoring high on CDR showed more retardation on a Stroop task involving the naming of body size and food words after consuming a high-calorie food than after consuming a lower calorie food (Ogden & Greville, 1993). Apparently, they were more preoccupied with food after having eaten a more 'forbidden' or higher calorie food. Thus, thoughts surrounding, and elicited by, food consumption clearly interfere with certain cognitive processes among dieters and those high in restraint.

### **What could be stressful about restraint?**

No research to date has thoroughly explored why those high in CDR are more stressed. When stress, anxiety, and depressive dieters symptoms have been directly assessed among dieters and those high in restraint, few clear findings have emerged. For instance, while dieters showed relative cognitive deficits, they did not score higher on state measures of anxiety and depression (Green & Rogers, 1995). However, anxiety and depression had not been assessed after any diet-related or distressing events. The measures used were also not specifically assessing dieting or body-related distress or cognitions. One study found that scores on a Perceived Stress Scale (PSS) were neither independently associated with CDR in a regression analysis nor did they differ between women with regular and irregular menstrual cycles (presumed to be related to elevations in cortisol) (McLean & Barr, 2003). However,

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